ESKRIDGE (J. T.)

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BY

J. T. ESKRIDGE, M.D.,

OF DENVER, COL.,

PROFESSOR OF NERVOUS AND MENTAL DISEASES IN THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF COLORADO; NEUROLOGIST TO THE ARAPAHOE COUNTY AND THE ST. LUKE'S HOSPITAL.

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WE shall study to-day the case of D. F., fifty years of age, colored, single, a male laborer, born in Kentucky, but who has been living in Colorado since 1872. As a child he was well and strong, and thinks he did not suffer from any of the diseases incident to early life. When two years old he had an attack of smallpox, and was ill about four months. At his thirtieth year he contracted a chancre. He has never indulged in alcohol to excess. During the last twelve years he has worked in damp places, and frequently contracted colds. Ten years ago the glands of his neck suppurated, and about that time he experienced numb and tingling sensations in the feet and legs below the knees. These sensations would pass away on exercising, but when at rest his legs would become stiff and painful. After suffering with these symptoms, which increased for some weeks, he had to quit work a week; he was then able to resume work, although for some months he was not entirely free from uncomfortable sensations in the legs and feet. Subsequently to this trouble he remained in good health until December, 1893, when, after working in a damp and cold place, he first felt numb and tingling sensations in his toes and

in the anterior portions of the soles of the feet. In a few days these sensations had spread all over the feet, and extended up the legs nearly to the knees. About this time his ankles seemed weak, so that he could not stand without some support. As he expresses it, he "rocked on his feet." Within two weeks from the time the numb and tingling sensations were first experienced in the feet he found his legs were paralyzed from the knees downward. About the time the legs were first paralyzed he felt a burning sensation in his hands, especially in the palms, and a numbness in the fingers, and a week or ten days later his arms were paralyzed from the elbows downward. A few weeks after the paralysis became manifest he was troubled less from burning and numb sensations. From December, 1893, to March, 1894, he was treated for rheumatism. About the latter date a disagreeable tingling sensation, which later assumed a distressing burning character, appeared in the feet, and was worse at night and during cloudy and inclement weather. Similar sensory disturbances soon afterward manifested themselves in the hands, but to a less intense degree. He was admitted into the nervous wards of the Arapahoe County Hospital, August 11, 1894.

Examination.—He lies in bed with all muscles below the knees completely paralyzed. Foot-drop is well marked, with extreme plantar contraction, and toes flexed, the great toes being flexed to the greatest possible degree. By using considerable force I am able to dorsally flex the feet at right angles with the legs. The legs lie straight at the knees, and he can flex and extend the legs at these joints, but the muscular power is slight. Flexion and extension at the hips are fairly good, but the muscles that make these movements are rather weak. Moving the legs and thighs at the knees and hips causes some pain, or a drawing sensation in the calf and posterior thigh-muscles. Extreme wasting has taken place in all the muscles below the knees, and to some extent in the

thigh-muscles. The greatest amount of muscular atrophy is found in the interossei of the feet and in the anterior tibial and peroneal groups. The trunk-muscles are nearly normal. Wrist-drop is present, with flexor contraction of the muscles of the hands and wrists. Both hands ordinarily lie in the wrist drop position, yet with considerable effort he is able to extend the left wrist on a line with the forearm, but he cannot extend it beyond this point. Marked atrophy is present in the muscles of the hands, most pronounced in the interossei and in those forming the thenar eminences. The muscles of the forearms are wasted, but to a much less degree than the muscles of the legs below the knees. The muscles of the upper arms are fairly strong, and present but slight wasting; the muscles of the shoulders appear normal; none of the muscles below the knees or elbows responds to the strongest faradic current from a large-sized Flemming battery. All these muscles show reaction of degeneration. The muscles of the neck, face, and larynx are not involved.

Sensory phenomena. Tactile sense, when tested by the contact of a feather, is lost on the feet and legs from a point about midway between the ankle-joints and knee-joints downward; the sense of touch is present down to a point about six inches above the ankle-joints; in the right hand and arm the feather in contact is not felt from a point four inches above the wrist-joint downward, and in the left, from a point about six inches above the wrist-joint downward, while a feather in motion can be felt over the greater portion of the backs of the hands and wrists, but is not perceived on the dorsal surfaces of the fingers, the palmar surfaces of the fingers and hands, and the anterior surfaces of the wrists, and the anterior surfaces of the arms from a point about two inches above the wrist-joints downward. Tactile sense is present and nearly normal over all other portions of the body. Pain-sense is present throughout the body, but is not normally acute in the areas of tactile anesthesia until

the skin is pierced. Temperature-sense is lost all over the feet, delayed, uncertain, and lessened over the ankles and areas of tactile anesthesia of the legs, and much perverted over the hands, but not lost as in the feet. Localization-sense is greatly disturbed, especially over the feet, as a sensation produced on the leg is referred to the foot, and sometimes to the foot of the opposite side. Pressure-sense is disturbed more in the hands than in the feet. Joint-sense and posture-sense are present and about normal. Muscular sense is absent.

The knee-jerks, the plantar, cremaster, and forearm reflexes are absent; abdominal and iritic reflexes are present. Taste, smell, hearing, and vision are about normal. The internal and external ocular muscles, and an ophthalmoscpic examination show no abnormalities.

During the five weeks he has been in the hospital there has been a steady but rather slow improvement of his condition. The contractures of the flexor muscles of the feet, the legs below the knees, the hands and the arms below the elbows, were so great that we were compelled to give the patient an anesthetic before the deformities could be overcome. After this procedure the hands and arms were put on padded splints, and by means of adhesive plaster the feet have been kept forcibly dorsally flexed. The apparatus was removed every second day, allowed to remain off several hours, and the parts thoroughly masséd. By the end of two weeks we had pretty well overcome the contractures in the flexors of the feet and ankles, and since then sand-bags laid at the soles of the feet have been sufficient to keep the feet in proper position. We have not been so successful in getting rid of the contractures of the hands and wrists, but these are much less than when the patient entered the hospital. The splints are now kept on the hands and arms about half the time. The muscles will not respond to the faradic current, and in consequence this is at present valueless in the treatment. The continuous and inter-

rupted galvanic current is the most useful form of electricity for nerves and muscles in this stage of the disease. His food has been as nutritious as the hospital affords, with abundance of soups, meats, and eggs. In the way of medicine, iron, arsenic, and strychnin have seemed most appropriate. To-day he is able to slightly flex and extend the right foot. No movements of the left foot have been regained. He is now able to extend both wrists. Tactile anesthesia is slightly less than when he entered the hospital. Peripheral paralysis of the left side of the face developed after the patient had been in the hospital two weeks.

Let us consider the nature of our patient's trouble. In the first place, I wish to call your attention to the marked symmetry of the disease, limited as it is mainly to the distal portions of the extremities; the failure of the muscles to respond to the faradic current, and changed reaction to the galvanic; the pronounced muscular atrophy with motor paralysis; loss of and disturbed sensory function. There are many diseases with which a case of this kind may be mistaken by the casual and superficial observer. The least likely is rheumatism, yet the patient tells us that he was treated during all of last winter for this affection. In the present instance only gross ignorance or criminal negligence would permit such a mistake. In rheumatism there sometimes occurs paralysis early in the disease, either of an inhibitory or hysterical origin; but this is rare, and it only lasts for a few days. I have seen one such case. The man was apparently unable to move a hand or foot, but the ankle-joints and knee-joints, not the nerves, were very tender, and were the seat of severe pain. Suspecting the character of the trouble, large doses of sodium salicylate were given, and within two days the patient began to move the hands and feet. Late in rheumatism there may be partial paralysis and well-marked wasting of the muscles below the affected joint in which adhesions have

occurred, producing a condition known as arthritic muscular atrophy; but there is no loss of sensation, the affected muscles respond to the faradic current almost normally, the disease is not symmetrical nor limited to the distal portion of the extremities. The temporary paralysis in the early stage of acute rheumatism, and the arthritic muscular paralysis usually affecting one limb, apparently from rheumatic inflammation of a large joint, are about the only points of similarity between rheumatism and the symptoms presented by the patient before us, while the symmetry of his disease, the distal portions of the limbs being as a rule alone affected, the electric changes, the sensory phenomena, and the nerves, instead of the joints, being involved, are abundantly sufficient to prevent a mistake in the diagnosis if care and judgment are used in the examination and summing up of the case.

In poliomyelitis the absence of objective sensory phenomena and the symmetry of the paralytic symptoms serve to distinguish this disease from the one before us. Spinal pachymeningitis is attended with radiating pains from the spine, with involvement of the trunk-muscles and those of the upper portions of the limbs, with severe pain on moving the muscles of the back, and with incomplete paralysis and sensory loss, distributed irregularly, symptoms very unlike those present in our patient. In acute ascending paralysis the feet, legs, thighs, trunk, and arms become affected in the order named. The ataxic symptoms manifested by the man before us, with loss of the knee-jerk, has more than once misled careless observers to mistake the disease for locomotor ataxia, but the latter disease has shooting pains, prominent eye-symptoms, anal and vesical disturbances, absence of paralysis until very late, when it is incomplete, and wrist-drop and foot-drop are never present. There are many other points of difference, but these are the most prominent. Myelitis affects the anal

and vesical sphincters, the muscles of the trunk up to the level of the spinal lesion, and when the lower portion of the cord is the seat of inflammation, anesthesia of the external genitalia and the parts around the anus is present. We can then exclude myelitis in this patient.

The character of the paralysis, the distribution of the anesthetic areas, the extreme muscular wasting and the well-marked electric changes which have taken place in the muscles, enable us at once to dismiss the suggestion of hysteria, an affection which should always be allowed to obtrude itself in the mind of every one when engaged in arriving at a diagnosis by exclusion in cases attended with paralysis and loss of tactile sense. We have left but one other affection, multiple neuritis, which will likely account for the condition of this man. The symptoms that this patient presents are typical of multiple neuritis. The symmetry of the parts affected is almost complete; the parts invaded are the extremities, in the arms below the elbows, and in the legs, principally the regions below the knees, although motor weakness is found in the muscles of the thighs, and to a slight extent in those of the hips, but no loss of sensation is found above the knees; the feet and hands are affected more than the forearms; wrist-drop and foot-drop, profound muscular wasting, with electric changes and absence of the deep reflexes—all go to make up a clinical picture the like of which is found only in multiple neuritis. When we call to mind that the vesical and anal sphincters have not been affected, and that the nerves were at one time tender and the seat of pain and distressing sensations, there seems to be no room to doubt the correctness of the diagnosis.

As the management of individual cases of multiple neuritis depends somewhat upon the cause of the inflammation, it will be well for us to inquire into the etiology of this man's attack. This man suffered from syphilis

twenty years ago, but syphilis in its tertiary stages attacks mainly fibrous and connective-tissue elements. I have not observed, or seen the report of a case of typical parenchymatous multiple neuritis caused by syphilis. It seems to me that we may dismiss the consideration of the syphilitic poison as a causative factor in this man's case. The principal causes for us to consider in the present instance are diphtheria, alcohol, malaria, exhaustion, insufficient nourishment, gout, rheumatism, and exposure to wet and cold. In the absence of the history of diphtheria or involvement of the muscles of the iris and palate, and the long duration of the disease (diphtheric multiple neuritis running its course in two or three months), we are justified in excluding the effects of diphtheric poison. The patient has never been addicted to the steady or excessive use of alcohol; he has not been exposed to malaria for more than twenty years; his work has not been exhausting; he has been able to obtain plenty of nutritious food, and he has never suffered from gout, so that we may as well dismiss all causes first enumerated except rheumatism and exposure to wet and cold. His occupation during the last twelve years has necessitated his being more or less exposed to damp and cold, and undoubtedly the slight attack of nervous disturbance from which he suffered some ten years ago was of the same character as the present one (though much lighter). He tells us that he has never suffered from attacks of acute rheumatism, and that he enjoyed good health from the time of his attack, ten years ago, until the beginning of his present illness, in December, 1893. It is probable, then, that to exposure we must attribute the cause of his trouble.

The duration of the disease is variable. The diphtheric form, as a rule, runs the shortest course, convalescence in the majority of instances being pretty well established, so that the patient is able to walk about, by

the end of the second or third month from the time the neuritis first became manifest. The alcoholic form is not infrequently slow in reaching its height. I have under my care at present a patient who suffered from neuritic pains, with absent knee-jerks, for eight months before the paralysis became so great that he was compelled to remain in bed. During the last two or three months of this period he was decidedly ataxic in the legs. In the majority of cases of multiple neuritis not due to diphtheria the disease is one or two months in reaching its acme; then it remains stationary for one, two, or three weeks, after which apparent recovery takes place in from a few to several months. It must be remembered that the muscular strength is not regained for several months after the patient is able to resume his duties. The parts that are first affected are usually the most seriously involved, and are the last to resume a normal condition. The legs, as a rule, improve before the hands and arms, although occasionally this order is reversed. The feet, and sometimes the hands, especially around the nails, remain hyperesthetic long after all spontaneous pain has subsided. Relapses greatly lengthen the course of the disease.

The vast majority of cases of multiple neuritis result in recovery. In a few cases the trunk-muscles, including the intercostals, are affected; then if the diaphragm becomes paralyzed, death takes place from failure of respiration. These are acute and rapid cases, and not infrequently end in death at the end of from six to ten days or two weeks. Cardiac failure in alcoholic and diphtheric cases sometimes causes sudden death. In a few the patient is worn out by pain, the annoyance of bedsores, and the presence of bronchitis. In such cases it is probable that the spinal cord is affected. In alcoholic cases, cardiac, renal, and hepatic complications may lend gravity to the prognosis. Mental failure is a common complication of the alcoholic variety of multiple

neuritis, but it usually passes away during convalescence. Sometimes there is simple failure of memory for recent events, but in typical cases patients become delusional and conceive the idea that they go out each day and take long walks, although they may be so completely paralyzed that they are unable to stand or even flex and extend the feet.

The treatment in the early stage of the acute cases consists of rest in bed, protecting the extremities from changes in temperature by means of flannels (when there is pain the flannels next to the skin should be kept moist by frequenly wringing them out in hot water), warm daily baths, if they do not inconvenience the patient too much, keeping the bowels open, and giving a febrifuge when there is a rise of temperature. As soon as the acute stage has subsided, massage and electricity and the internal administration of strychnin, arsenic, quinin, and iron are indicated. The nutrition should be maintained throughout the course of the disease by means of good, nutritious food, of which animal food should form a large proportion during convalescence, and cod-liver oil may be added to the list of nutrients. Relapses may be prevented, as a rule, by protecting the affected parts from cold by means of flannels worn next to the skin. Massage should not be resorted to while the nerves and muscles are sensitive, but gentle rubbing of the limbs from the distal portions toward the body is often grateful to the patient early in the disease. It is doubtful how much the galvanic current hastens resolution of the nerves and muscles, but the nutrition may be partially maintained and extreme atrophy of muscular tissue prevented, by causing gentle contraction of the paralyzed muscles until the patient regains voluntary control over them. When the muscles readily respond to the faradic current this may be used, but the current should be no stronger than is necessary to effect gentle contraction of the most affected muscles. In the majority of cases the faradic current

will not produce muscular contraction in the extensors of the wrist and the anterior tibial and peroneal groups. For all muscles that will not respond to the slowly-interrupted faradic current of moderate strength the interrupted galvanic must be used, taking care not to exhaust the muscles by prolonging the séances to too great a length, and effecting too vigorous contractions. From three to five minutes is long enough for each of the largest groups of muscles, and a slight muscular contraction is less likely to do harm, and is capable of doing more good than vigorous movements. Electricity for this purpose may be applied daily or every alternate day. It is your duty to prevent troublesome contractures of the flexor muscles of the legs and arms, with resulting deformity of the feet and hands, such as this man presents. This may be done by keeping the feet at right angles to the legs by meane of sand-bags placed at the soles of the feet, and occasionally placing the forearms and hands on padded splints.

I have nearly finished what I had intended to say about this case, but have not referred, except in the examination, to the unilateral facial paralysis. This has come on some nine months after the beginning of the attack of multiple neuritis. At my first visit to this patient there was no paralysis of the face, but about two weeks subsequently I first observed it. He had been lying near an open window, and the affected side of the face was exposed to a draught of air. In all probability it has no connection with his general trouble. It is a local neuritis and does not modify the prognosis at all. Facial paralysis during the acute stage of multiple neuritis would, as a rule, excite grave apprehension, as it would indicate that the trouble was affecting nerves not usually involved in this disease, and fear of cardiac and respiratory failure might justly be entertained.